

**ABSTRACT**

Systems for analyzing multiple samples in parallel using mass spectrometric preferably coupled with fluid phase separation techniques are provided. A multi-analyzer mass spectrometer includes multiple inlets, multiple mass analyzers, and multiple transducers to  
5 conduct mass analyses of multiple samples in parallel. A modular mass analyzer may include a vacuum enclosure, a chassis, and multiple mass analysis modules disposed within the chassis. Modules are preferably disposed in a spatially compact two-dimensional array. A common multi-stage vacuum system may be utilized in conjunction with baffles or partitions disposed within and between modules to maintain differential vacuum conditions within the spectrometer  
10 utilizing a minimum number of pumps. Common control inputs may be provided to multiple modules or other components within a multi-analyzer spectrometer. Fluid phase separation devices for use with a multi-analyzer spectrometer may be microfluidic devices utilizing chromatographic, electrophoretic, or other separation methods.